

ROBOSPHERE 2004

NASA Ames Research Center
November 9-10, 2004

CALL FOR SUBMISSIONS

Self-sustaining robotic systems promise to extend the duration of robotic presence and the robustness and productivity of robot-human interaction on planetary surfaces and in space.

The Robosphere 2004 workshop will explore the notion of self-sustaining robotic systems as a means of achieving increased scientific returns, decreased exploration costs and reduced chances of mission failure.

This is the second workshop in this area organized at NASA Ames. The first, held in November 2002, considered the propositions that (a) self-sustaining systems need to provide not only for agent coordination, but also for the exchange of matter (parts) and energy, and that (b) increased complexity need not come at the cost of decreased stability or survivability. The current workshop extends those interests to also encompass explicit consideration of human presence and coordination with self-sustaining robotic systems. Instead of paving the way for “eventual” human presence, as implied in the 2002 workshop, self-sustaining robotic systems can now be planned in the context of an official policy of human exploration, as dictated by the recent presidential mandate for NASA. In the same context we will consider robotics for the construction or deployment of human habitats

We often use the term *robotic ecology* to summarize this concept. Self-sustaining systems will be complex, requiring elements to interact on many different levels. Nature provides examples of self-sustaining systems—ecologies—where interactions involve information, matter, and energy exchanges; and where complexity confers stability. Natural ecologies are thus a source of inspiration for the types of systems we need to build. On the other hand, many valid approaches to self-sustaining human/robotic systems are not inspired by biological principles.

Attendance at the Robosphere workshop is by invitation only. To request an invitation, please submit an extended abstract (3 to 5 pages) or a statement of interest. The deadline for submissions is September 1st, 2004. Submissions should be made via email to robosphere-submissions@email.arc.nasa.gov as plain text, MS Word or PDF attachments.

Workshop and registration information will be posted at <http://robosphere.arc.nasa.gov>. The registration fee is \$150 (\$200 after Oct 8th); payment details will be specified on the web site.

Accepted extended abstracts will be printed in workshop proceedings. At the discretion of the program committee, authors will be asked to present their work as a short talk, long talk or as a poster. Authors of outstanding work will be invited to prepare full length papers for inclusion in a volume or special journal edition to be published after the workshop. If requested, these papers will be due Dec 15, 2004.

POC: Dr. Silvano Colombano, NASA Ames Research Center
(Silvano.P.Colombano@nasa.gov).

Topics of interest include:

- **Self-sustaining robotic systems**
 - _ Robotic ecologies
 - _ Robotic Systems Science
- **Long duration explorer robots on Mars or the Moon**
 - _ Mechanical challenges
 - _ Energy
 - _ Sheltering
- **Small robotic teams capable of mutual repair**
 - _ Modular robotics
 - _ Reconfigurable robotics
 - _ Self-repair, recycling and self-replication
- **Robotics outposts**
 - _ Functional specialization
 - _ Energy production
 - _ Utilization/production of parts
- **Planetary robotic infrastructures**
 - _ Robotic “oases”
 - _ Robotic “highways”
 - _ Robotic “factories”
 - _ Scientific exploration infrastructure
 - _ Communications/networks
- **Robotic colony autonomy**
 - _ Distributed planning and scheduling
 - _ Mixed-initiative planning
 - _ Distributed execution monitoring and diagnosis
 - _ Self-organization and cooperative strategies
 - _ Colony models from biology and ecology, swarms
 - _ Robotic ecologies with different scales (from rovers to nanobots)
- **New mission concepts**
 - _ Bringing parts
 - _ In situ exploration staging
 - _ Failure resistant planetary exploration
- **Beyond Mars , Moon and Earth Orbit**
 - _ Creating other planetary outposts
 - _ Robotic colonies for asteroid mining and small body exploration
 - _ Packaging robotic colonies for deep space travel
- **Robot ecologies for large-scale orbital construction**
 - _ Solar power satellites
 - _ Large aperture observatories
 - _ Orbital colonies
- **Robotic infrastructure as a preparatory stage to human exploration**
 - _ Common needs for robotic and human survival
 - _ Tested energy sources
 - _ Enhanced safety
- **Self-sustaining robotic systems and human presence**
 - _ Flexible autonomy
 - _ Habitat construction and tending
 - _ Movable bases (Habot)
- **Earth based development and testing**
 - _ “Robosphere1”: An Earth based robotic ecology environment
 - _ “Virtual Robosphere1”
 - _ Internet outreach

ORGANIZERS

General Chair: Silvano Colombano (Ames)

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Program committee (please check the workshop web site)

IMPORTANT DATES

September 1 st	Extended abstract deadline
September 25	Announce accepted submissions
October 8 th	Early registration deadline
October 10	Final extended abstracts are due
November 9-10	Workshop

WORKSHOP SPONSORS

- NASA-Ames Research Center
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